



Oil Well Refinery Operations

General Facts and Information

This fact sheet is provided to address common health and safety issues regarding the presence of oil refineries near military personnel during deployment operations abroad. General information is provided about local refinery facilities and operations and the types of emissions that may be expected in the area. This information is provided to familiarize you with the sources of potential environmental exposure risks and how these relate to your health.

What is an oil refinery? An oil refinery is an organized and coordinated arrangement of manufacturing processes designed to produce physical and chemical changes in crude oil to convert it into everyday products like

gasoline, diesel, lubricating oil, and fuel oil.

Petroleum is a complex mixture of organic



Figure 1 Photo courtesy Phillips Petroleum Company

liquids called crude oil and natural gas, which occurs naturally in the ground and was formed millions of years ago, hence the term “fossil fuels”. Refineries process components into refined products.

What is the problem with Refineries? –

Even in the USA refineries can be a major source of pollution and hazardous waste. Inadequate plant design, poor management, faulty equipment, lack of environmental controls, and damage due to combat activities, etc. may have significant impact on the local refineries resulting in less than optimal system performance. If the refinery operation is poorly designed or compromised, the release of pollutants to the surrounding environment may result in short-term exposure levels above the limits

established by our own National Ambient Air Quality Standards (NAAQS).

What kinds of pollution can be expected from refineries?

Air – The most obvious will be visible at a good distance from the source(s) and may include the following:

- Sulphur oxides
- Hydrocarbon vapors
- Smoke
- Smells



Water - Potential sources of water pollution include cooling water, surface water (rain) and water that is actually used as part of the refinery processes. Liquid releases or discharges from a refinery may contain heavy metals, such as lead, and hydrocarbons.

Land – Materials, such as hydrocarbons, used in the process should be returned through a network of collection pipes and a series of dewatering tanks called a “slop” system then reprocessed through the distillation units. Wastes that cannot be reprocessed can be recycled to manufacturers, disposed of in approved facilities, or chemically treated on-site to form inert materials, which can be disposed to a landfill within the refinery. A permitting process to document and control the

movement of waste material is usually required according to the host country's environmental laws. In the U.S. a "Process Liquid, Sludge and Solid Waste Disposal Permit" is used and wastes that go off-site must have an EPA "Waste Transport Permit".

What are the exposure risks to troops in the field near these plants? Airborne emissions from the burning of waste aromatic hydrocarbons produce smoke containing particulates, sulfur dioxide, nitrogen oxides, and various other products of petroleum combustion. Health risk assessments performed by the Army's Center for Health Promotion and Preventive Medicine (CHPPM) indicates no increased health risk to individuals living in the area for no more than 2-years. Intermittent and short-term effects can occur during on-going acute exposures during the peak periods of refinery operations.

These effects are worsened by pre-existing conditions, such as



asthma, cigarette smoking, and upper respiratory allergies. These effects are reversible and may include skin irritation; runny nose, cough, shortness of breath; eye nose and throat irritation; and aggravation of sinus or asthma conditions.

What types of controls are used to prevent the release of pollution? Standard pollution control equipment may include mechanical separators, filtration devices, particulate scrubbers, wet collectors, electrostatic precipitators, gas adsorbers and combustion incinerators. Well-run refinery operations employ a variety of process and engineering controls designed to safeguard

the environment and manage the environmental aspects of the refining process. Control mechanisms may not exist or may no longer be effective in controlling pollution near a deployment location. The excessive loss of hydrocarbons to the surrounding environment has a negative financial impact in terms of dollars lost in product, so there is incentive to control hydrocarbon losses. Efforts to control other wastes, such as nitrogen oxides, sulfur dioxide, particulates, benzene, smog-causing VOCs and carbon monoxides may not be a high priority due to the cost and technologies involved.

What measures are being taken to protect the health and welfare of troops located near compromised refinery operations? -

Under less than optimal conditions, environmental health site assessment teams must evaluate and investigate potential risks to personnel through observation and measurement of the surrounding environment. Assessment of risks to personnel begins with the environmental health site assessment process before units are positioned on the ground. An on-going preventative health management program will include the collection of environmental samples from air, soil and water. The information collected from sampling the surrounding environment is used to continually track and monitor the health risks presented to troops from exposure to these sources of pollution as well as all other potential exposure sources that occur during your deployment. All potential sources of damage to health, welfare and the environment are taken into account during the EHSA process, including oil well fires, open pit burning, and routine occupational exposure for industrial operations.